IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

PRESIDENT AND FELLOWS OF HARVARD COLLEGE,

Plaintiff,

v.

UNITED STATES DEPARTMENT OF HEALTH AND HUMAN SERVICES, *et al.*,

Defendants.

Civil Action No.: 1:25-cv-11048-ADB

Leave to file granted on June 6, 2025 and supplemental leave to file granted on June 9, 2025

BRIEF OF *AMICI CURIAE* AMERICAN UNIVERSITY; BOSTON UNIVERSITY; BROWN UNIVERSITY; CALIFORNIA INSTITUTE OF TECHNOLOGY; COLORADO STATE UNIVERSITY; DARTMOUTH COLLEGE; GEORGETOWN UNIVERSITY; JOHNS HOPKINS UNIVERSITY; MASSACHUSETTS INSTITUTE OF TECHNOLOGY; MICHIGAN STATE UNIVERSITY; OREGON STATE UNIVERSITY; PRINCETON UNIVERSITY; RICE UNIVERSITY; RUTGERS UNIVERSITY; STANFORD UNIVERSITY; TUFTS UNIVERSITY; UNIVERSITY OF DELAWARE; UNIVERSITY OF DENVER; UNIVERSITY OF MARYLAND, BALTIMORE; UNIVERSITY OF MARYLAND, COLLEGE PARK; UNIVERSITY OF OREGON; UNIVERSITY OF PENNSYLVANIA; UNIVERSITY OF PITTSBURGH; AND YALE UNIVERSITY IN SUPPORT OF PLAINTIFF'S MOTION FOR SUMMARY JUDGMENT

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INTEREST OF *AMICI CURIAE*[1]

Amici curiae are U.S. research universities. For decades, these institutions have competed for and received federal funding for scientific research. They have leveraged those resources, along with investments of their own, to advance scientific knowledge and thereby make Americans more prosperous, healthy, and secure.

In that way, *amici* have been participants in a historic collaboration between the federal government and universities. The partnership dates back to World War II, and it has fueled progress and underwritten America's position in the world ever since. This research enterprise is one of the Nation's greatest assets in the fight to maintain global competitiveness, and *amici* submit this brief to illustrate the magnitude of the harm that will result if it is compromised.

INTRODUCTION

For over 80 years, the federal government has invested heavily in scientific research at U.S. universities. This funding has fueled American leadership at home and abroad, yielding radar technology that helped the Allies win World War II, computer systems that put humans on the Moon, and a vaccine that saved millions during a global pandemic. Many of these life-changing and history-altering innovations came out of work that had an entirely different initial focus. When Princeton Professor Edward Taylor began studying pigment found in butterfly wings, for example, he never dreamed his work would one day produce a lung cancer drug. And because it can be difficult to foresee profitable uses of this sort of "basic research"—that is, inquiry that aims to expand knowledge, with no application in mind—there is little incentive for

[1] In accordance with Federal Rule of Appellate Procedure 29(a)(4)(E), *amici* certify that (1) this brief was authored entirely by counsel for *amici curiae* and not by counsel for any party, in whole or part; (2) no party or counsel for any party contributed money to fund preparing or submitting this brief; and (3) apart from counsel for *amici curiae*, no other person contributed money to fund preparing or submitting this brief. No party opposes its filing.

private investment. Simply put, breakthroughs from academic research save and improve lives and build economies. And they require federal funding to do so.

Broad cuts to federal research funding endanger this longstanding, mutually beneficial arrangement between universities and the American public. Terminating funding disrupts ongoing projects, ruins experiments and datasets, destroys the careers of aspiring scientists, and deters investment in the long-term research that only the academy—with federal funding—can pursue, threatening the pace of progress and undermining American leadership in the process.

ARGUMENT

I. America Has Long Advanced Scientific Research in Partnership with Universities

Since the Civil War, the United States has advanced scientific progress by collaborating with institutions of higher education. *See* Morrill Land Grant College Act, 7 U.S.C. §§ 301-305 (1862). Early on, federal support was quite limited. Daniel P. Gross & Bhaven N. Sampat, Nat'l Bureau of Econ. Rsch., *Inventing the Endless Frontier* 4 (2020) ("Gross & Sampat"). That changed leading up to World War II, however, as leaders began to realize the Nation's scientific capabilities lagged behind those of its adversaries. *Id.* at 4-5, 5 n.1. To close the gap, President Roosevelt established the Office of Scientific Research and Development (OSRD). *Id.* at 5-6.

The investment paid off. Research carried out by universities played a pivotal role in America's victory in the war. For example, OSRD worked with MIT to establish a laboratory to study radar. T.A. Saad, *The Story of the M.I.T. Radiation Laboratory*, 5 IEEE Aerospace and Electronic Systems Magazine at 46 (Oct. 1990). MIT's advances played a major role in stymieing German air attacks, guiding bombers over the beaches at Normandy, and neutralizing the U-boats that once decimated Allied ships. *Id.* at 49. Indeed, radar technology was so crucial

that it is often said that while the atom bomb ended the conflict, radar won the war. *Id.*[2]

Those experiences made clear to the Nation's political leadership that investing in academic scientific research was "essential" to the Nation's ability to "maintain a position of world leadership." Vannevar Bush, *Science, the Endless Frontier* 8 (July 5, 1945), *reprinted in Science, the Endless Frontier: 75th Anniversary Edition* (Nat'l Sci. Found. 2020). Accordingly, Congress created new agencies, like the Atomic Energy Commission, and reconfigured existing ones, like the National Institutes of Health ("NIH"), to prioritize academic scientific research. *See* Jeffrey K. Stine, Task Force on Sci. Pol'y Comm. on Sci. & Tech., 99th Cong., *A History of Science Policy in the United States, 1940-1985*, at 27-30 (Comm. Print 1986). The result has been a symbiotic partnership. The government identifies projects that are vital to the national interest.[3] Agencies award funding for those initiatives, usually on a competitive basis, selecting recipients based on scientific merit and their ability to create value for the American people.[4] And in exchange, the country's top scientists harness federal resources to drive gains in fields from nuclear power to biomedicine to artificial intelligence. *See infra* at pp. 3-7.

II. The Academic-Government Partnership Has Made America a Global Leader

This sustained investment in research universities has delivered for the American public. One need look no further than the Internet to find a shining example. The Internet was not the product of a single creator's lightbulb moment. It emerged from a decades-long collaboration

[2] Of course, the atom bomb itself also derived from a partnership between government and academia: The Manhattan Project emerged from federally funded research at the University of Chicago, UC Berkeley, and Columbia University. Gross & Sampat, *supra*, at 6 n.5.

[3] *See* Carol LaBonne, *Universities and the Government: Which Needs the Other More?*, Wash. Post (June 3, 2025), https://www.washingtonpost.com/opinions/2025/06/03/government-universities-partnership-innovation-prosperity ("LaBonne"); Homer A. Neal et al., *Beyond Sputnik: U.S. Science Policy in the 21st Century* 21-22 (2008) ("Neal").

[4] *See* LaBonne, *supra*; Neal, *supra*, at 17.

among academia, government, and industry. Early work on computer networking was done in the 1960s by J.C.R. Licklider, an MIT scientist. Barry M. Leiner et al., *A Brief History of the Internet* (1997), *reprinted in* 39 Comput. Commc'n Rev. No. 5, at 23 (2009) ("Leiner"). His work evolved thanks to researchers like Robert Kahn (a Princeton Ph.D. and former MIT professor) and Vinton Cerf (then of Stanford University), who published a seminal paper on the Internet's design in 1974. *See id.* at 24-25. And with federal support, universities made breakthrough after breakthrough—the Transmission Control Protocol/Internet Protocol (TCP/IP),[5] the browser,[6] and more. Each helped the Internet develop into what it is today. And the nature of the researchers' funding facilitated these discoveries. At the outset, few could imagine the modern Internet. And researchers surprised even themselves—for example, they discovered email by accident.[7] The Internet became reality only because the federal government made a decades-long investment in these projects, despite the uncertainty of the undertaking.

Sustained government-university collaboration has contributed to everything from nuclear reactors to cancer treatments to Google.[8] Indeed, *amici* institutions have furthered scientific progress in countless ways—from a pathbreaking study that identified the common causes of cardiovascular disease (Boston University)[9] to the first automated DNA sequencer

[5] TCP/IP enables devices to communicate across networks. Leiner, *supra*, at 25-26. Federal funding supported efforts to implement TCP/IP at Stanford and other institutions. *Id.* at 26.

[6] David C. Mowery & Timothy Simcoe, *Is the Internet a US invention?*, 31 Rsch. Pol'y 1369, 1378 & n.16 (2002) ("Mowery").

[7] *The Federal Research Portfolio: Capitalizing on Investments in R&D*: *Hearing Before the S. Comm. on Com., Sci. & Transp.* (July 17, 2014) (written testimony of Vinton G. Cerf).

[8] George W. Bush Presidential Ctr., *The Innovation Impact of U.S. Universities* 23-24 (2020), https://www.bushcenter.org/publications/the-innovation-impact-of-u-s-universities.

[9] NIH, Off. of Sci. Pol'y, *The Framingham Heart Study*, https://www.framinghamheartstudy.org/files/2021/07/FHS-Laying-the-Foundation-from-NIH.pdf (last visited June 8, 2025).

(Caltech)[10] to pioneering hurricane forecasting (Colorado State)[11] to the technology behind the pacemaker and GPS navigation (Johns Hopkins)[12] to the invention of the telephone and computer (MIT)[13] to new methods for protecting the U.S. power grid (Oregon State)[14] to the first cloning of a vertebrate (Oregon)[15] to vital discoveries in computer security and climate science (Princeton)[16] to the left-ventricular heart bypass device (Rice)[17] to deepfake detection software (Rutgers)[18] to recombinant DNA technology (Stanford)[19] to making the first life-sustaining liver

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[10] Robert Tindol, *Caltech and the Human Genome Project*, Caltech News (June 26, 2000), https://www.caltech.edu/about/news/caltech-and-human-genome-project-406.

[11] Stacy Nick, *The nexus of hurricane research,* Colo. State Univ. (July 11, 2024), https://source.colostate.edu/how-did-the-preeminent-hurricane-research-center-arrive-at-a-landlocked-university.

[12] *Innovations and Breakthroughs*, Johns Hopkins Univ., https://www.jhuapl.edu/about/history/innovations-and-breakthroughs (last visited June 8, 2025).

[13] Ed Pilkington, *The MIT factor*, Guardian (May 17, 2011), https://www.theguardian.com/education/2011/may/18/mit-massachusetts-150-years-genius.

[14] Michelle Klampe, *OSU researchers complete electrical mapping project critical to protecting the U.S. power grid*, OSU News (Aug. 14, 2024), https://news.oregonstate.edu/news/osu-researchers-complete-electrical-mapping-project-critical-protecting-us-power-grid.

[15] Off. of the Vice President for Rsch. & Innovation, *Zebrafish*, Univ. of Or., https://research.uoregon.edu/zebrafish (last visited June 8, 2025).

[16]Scott Lyon, *Internet researchers reach beyond academia to close major security loophole* (Oct. 14, 2024), https://engineering.princeton.edu/news/2024/10/14/internet-researchers-reach-beyond-academia-close-major-security-loophole; Liz Fuller-Wright, Off. of Commc'ns, Princeton Univ., *'Great fun': Manabe wins Nobel Prize in physics for modeling climate change* (Oct. 5, 2021), https://www.princeton.edu/news/2021/10/05/great-fun-manabe-wins-nobel-prize-physics-modeling-climate-change.

[17] B.J. Almond, *Rice engineers help design a pulse-less pump for heart replacement*, Rice Univ. News & Media Rels. (June 27, 2008), https://news2.rice.edu/2008/06/27/rice-engineers-help-design-a-pulse-less-pump-for-heart-replacement/.

[18] Trevor Rutledge-Leverenz, *Rutgers Office for Research Executes Exclusive License with Startup Steg.AI*, Rutgers Univ. Off. for Rsch. (Mar. 29, 2023), https://research.rutgers.edu/news/rutgers-office-research-executes-exclusive-license-startup-stegai.

[19] James Labosier & John Rees, *Stanley N. Cohen Papers Open for Research*, Nat'l Libr. of Med. (Jan 24, 2025), https://circulatingnow.nlm.nih.gov/2019/01/24/stanley-n-cohen-papers-open-for-research/.

transplant possible (University of Pittsburgh).[20]

These discoveries would not have occurred without federal funding. Often, that is because the basic research universities conduct is so fundamental that it is hard to predict how it might be commercialized. Take the work of Princeton Chemistry Professor Edward Taylor, who started out studying butterfly wing pigment.[21] It is hard to imagine a topic with fewer clear uses (and thus less likely to receive private support). Yet Professor Taylor's findings led him to develop a revolutionary lung cancer drug. He credits the discovery to the "freedom" Princeton gave him to "work[] way out in left field," which would have been "impossible in industry."[22]

Even when potential applications are easier to forecast, federal funding can be crucial for the Nation's most ambitious research. For example, in 1988, the government created a $3 billion, 15-year project to sequence the human genome. This foundational undertaking enabled treatments—and even cures—for genetic conditions, including sickle cell anemia and vision loss.[23] It has also opened the door for personalized gene editing, which just this year cured an infant of a deadly condition for the first time.[24] And yet because the project required substantial

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[20] Univ. of Pittsburgh Med. Ctr., *Transplant Pioneer Thomas E. Starzl Receives National Medal of Science from President George W. Bush* (Feb. 13, 2006), https://www.upmc.com/media/news/starzl-medal-science.

[21] Karin Dienst, Off. of Commc'ns, Princeton Univ., *Princeton chemist Edward C. Taylor, inventor of anti-cancer drug, dies at 94* (Nov. 29, 2017), https://www.princeton.edu/news/2017/11/29/princeton-chemist-edward-c-taylor-inventor-anti-cancer-drug-dies-94.

[22] *From Butterflies to Tomorrow's Chemists* (Apr. 22, 2016), https://alumni.princeton.edu/stories/butterflies-tomorrows-chemists-professor-emeritus-ted-taylor-helps-discovery-take-flight.

[23] *See, e.g.*, Mayo Clinic, *Gene Therapy* (April 23, 2024), https://www.mayoclinic.org/tests-procedures/gene-therapy/about/pac-20384619.

[24] Gina Kolata, *Baby Is Healed With World's First Personalized Gene-Editing Treatment*, N.Y. Times (May 15, 2025), https://www.nytimes.com/2025/05/15/health/gene-editing-personalized-rare-disorders.html.

upfront funding and years of study, it is unlikely a private backer would have pursued it.[25] Likewise, one of the most monumental scientific achievements in recent memory was made possible by federal funding. When the coronavirus swept the globe in 2020, a vaccine was released in record time thanks to federally supported research conducted by scientists at the University of Pennsylvania.[26] The underlying academic work had been too unproven for private investment.[27] Without federal support, the COVID-19 vaccine likely would have taken years, even decades, to develop, rather than months. *See* NIDCR, *supra*. In short, as these examples vividly confirm, it is often true that the boldest research—with the most potential to redound to humanity's benefit—depends on public investment.

This partnership between the government and academia propelled the United States to preeminence on the world stage. American scientific investment is unique—in its scale, its reliance on academia, and its support for basic research. Mowery, *supra*, at 1382-83. In information technology, for example, countries such as Britain and France invested less, failed to facilitate collaboration among government and academia, or focused on promoting specific technologies and commercialization instead of basic research. *Id.* Thanks to these dynamics, by the end of the twentieth century, the United States "held a commanding lead" in the field.[28]

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[25] *See* Rebecca Mandt et al., *Federal R&D funding: the bedrock of national innovation*, 1 MIT Sci. Pol'y Rev. 44, 48 (Aug. 20, 2020) (industry declines to fund basic research due to its "risk-reward profile and timeline to commercial relevance") ("Mandt").

[26] Nat'l Inst. of Dental & Craniofacial Rsch., *NIDCR Funded Winner of 2023 Novel Prize in Physiology or Medicine*, NIDCR News (Oct. 16, 2023), https://www.nidcr.nih.gov/news-events/nidcr-news/2023/nidcr-funded-winner-2023-nobel-prize-physiology-or-medicine ("NIDCR").

[27] Ting Yu, *How Scientists Drew Weissman (MED '87, GRS '87) and Katalin Karikó Developed the Revolutionary mRNA Technology Inside COVID Vaccines*, Bostonia (Nov. 18, 2021), https://www.bu.edu/articles/2021/how-drew-weissman-and-katalin-kariko-developed-mrna-technology-inside-covid-vaccines/.

[28] Nat'l Rsch. Council, *Evolving the High Performance Computing and Communications Initiative to Support the Nation's Information Infrastructure* 13 (1995); *see id.* at 16.

Similar patterns emerge in medicine. Researchers have connected the ingenuity of the biotechnology sector to the outsized role played by universities.[29] And they have concluded that the "strength of the public research base" in the field is "surely among the most important" reasons America "lead[s] the world."[30] It is no surprise, then, that other countries have come to see the U.S. research enterprise as something to emulate. *See* Neal, *supra*, at 17.

Federal investment in U.S. universities has also been a powerful driver of economic growth for Americans. University-generated research has created and expanded industries and produced some of the Nation's largest companies. A National Science Foundation ("NSF") grant supported the research that ultimately led to Google.[31] And by 2010, the human genome project had generated $796 billion in economic output, including $244 billion in income—a massive return on its $3.8 billion price tag.[32] The evidence is not just anecdotal. In 2024, each dollar the NIH invested in research yielded $2.56 in economic activity nationwide.[33] Increased funding for universities is also associated with more successful local startups.[34] And as of 2020, nearly a third of recently filed patents cited federally funded research. Mandt, *supra*, at 48.

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[29] *See* Iain M. Cockburn & Rebecca M. Henderson, Nat'l Bureau of Econ. Rsch., *Publicly Funded Science and the Productivity of the Pharmaceutical Industry* 23-25, *in* 1 Innovation Policy and the Economy (2001).

[30] *Id.* at 4; *see* Andrew A. Toole, *The impact of public basic research on industrial innovation*, 41 Rsch. Pol'y 1, 9 (2012) (finding a "systematic relationship" between NIH basic research grants to universities and "pharmaceutical industry innovation.").

[31] NSF, *On the Origins of Google* (Aug. 17, 2004), https://www.nsf.gov/news/origins-google.

[32] *See* Simon Tripp & Martin Grueber, Battelle Mem'l Inst., *Economic Impact of the Human Genome Project* 15 (May 2011), https://www.battelle.org/docs/default-source/misc/battelle-2011-misc-economic-impact-human-genome-project.pdf.

[33] United for Med. Rsch., *NIH's Role in Sustaining the U.S. Economy* 1 (2025), https://www.unitedformedicalresearch.org/wp-content/uploads/2025/03/UMR_NIH-Role-in-Sustaining-US-Economy-FY2024-2025-Update.pdf.

[34] *See* Valentina Tartari & Scott Stern, Nat'l Bureau of Econ. Rsch., *More than an Ivory Tower* 6-7 (2021), https://www.nber.org/papers/w28846.

Breakthroughs also create positive feedback loops. Each advance allows a future researcher to stand on the shoulders of those who have come before, fueling further innovation and growth.

III. Funding Cuts Imperil America's Status in the World

Extensive cuts to federal research funding to universities threaten much of what has made the U.S. research enterprise a juggernaut of growth and prosperity. Even schools that do not experience direct cuts will suffer. Scientists work across institutions; grants issued to one university frequently support researchers from others. And cutting-edge research is often conducted via collaboration. For example, the NIH has funded work by a group of institutions including Harvard, MIT, and Princeton to generate wiring diagrams of the brain and use artificial intelligence to analyze the results. This project would shed light on the mechanisms of memory dysfunction and could yield tools to treat Alzheimer's disease. But the cuts at Harvard put it at risk. The work cannot continue at individual sites; MIT cannot use machine learning to uncover patterns, for example, without data from Princeton and Harvard. The withdrawal of federal support at even one institution is thus a blow to the entire ecosystem and deters the long-term investment necessary for scientific and technological progress.

Even temporary cuts would have permanent effects. As Princeton Professor Yibin Kang has noted, academic "[r]esearch is not like a faucet you can turn on and off."[35] Many projects cannot pause; they will end, squandering years of work and funding. If samples are spoiled, data lost, or clinical trials cut short, researchers will have to start at square one even if funding is restored, while other countries poach scientists and overtake American progress. For example, fusion energy researchers are making tremendous advances toward an inexhaustible source of

[35] Liz Fuller-Wright, Off. of Commc'ns, Princeton Univ., *The partnership that drives America's leadership in medical discovery* (Feb. 18, 2025), https://www.princeton.edu/news/2025/02/18/partnership-drives-americas-leadership-medical-discovery-how-it-works-and-whats.

clean energy.[36] Federal funds have also driven progress in artificial intelligence and quantum science.[37] The United States leads the world in these areas—for now. But without the resources and backing of the federal government, there is no guarantee America will maintain its edge.[38]

Widespread cuts would also gut the next generation of U.S. scientists. Research gives budding scientists opportunities to cultivate skills, build confidence, and learn from senior scholars. Young scientists need that training to succeed, whether they ultimately go on to industry, government, or academia. Funding cuts would erode the pipeline and pressure these talented scientists to change fields or move abroad. In short, the government's actions here imperil innovation both today and tomorrow.

In sum, terminating funding to universities jeopardizes American innovation and economic growth by severely limiting their ability to play their vital, longstanding roles in expanding scientific knowledge. These cuts to research funding risk a future where the next pathbreaking innovation—whether it is a cure for cancer or Alzheimer's, a military technology, or the next Internet—is discovered beyond our shores, if at all.

CONCLUSION

For the foregoing reasons, this Court should grant the motion for summary judgment.

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[36] MIT, *American Innovation*, https://understanding.mit.edu/american-innovation (last visited June 8, 2025); Princeton Univ., *Princeton Plasma Physics Laboratory*, pppl.gov (last visited June 8, 2025).

[37] *See, e.g.*, Whitney Clavin, *Proving Quantum Computers Have the Edge*, Caltech News (Apr. 9, 2025), https://www.caltech.edu/about/news/proving-quantum-computers-have-the-edge; Jaimie Patterson, *Sepsis Detection Platform Prevents Thousands of Deaths*, Johns Hopkins Univ. (Apr. 23, 2025), https://hub.jhu.edu/2025/04/23/nsf-funding-suchia-saria-sepsis-detection/.

[38] *See* Tom Clynes, *Is China Pulling Ahead in the Quest for Fusion Energy?*, IEEE Spectrum (Apr. 29, 2025), https://spectrum.ieee.org/china-nuclear-fusion-reactor; Mark Kennedy, Wilson Ctr., *Red Flags in the Tech Race* (Jan. 14, 2025), https://www.wilsoncenter.org/article/red-flags-tech-race-america-must-act-now-preserve-its-innovation-edge.

Dated: June 9, 2025

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**Pro hac vice* application forthcoming
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CERTIFICATE OF COMPLIANCE

I hereby certify that the foregoing complies with this Court's Order, ECF No. 47 (Apr. 29, 2025), and does not exceed 10 pages.

Dated: June 9, 2025

/s/ Daniel J. Cloherty
Daniel J. Cloherty

CERTIFICATE OF SERVICE

I hereby certify that on June 9, 2025, I electronically filed the foregoing with the Clerk of the Court using the CM/ECF system. Notice of this filing will be sent to all attorneys of record by operation of the Court's electronic filing system.

Dated: June 9, 2025

/s/ Daniel J. Cloherty
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